

# DRAGON USER



*The independent Dragon magazine*

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February 1986

**Dragon's Third  
Dimension**

**6809 Show Report**

**People's Chart**

**Incentive Compo  
25 games to be won**





# DRAGON USER



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News is a special section

The quality of the material we can publish in  
Dragon User each month will be a very great  
extent depend on the quality of the  
information that you can make with your  
Dragon. The Dragon computer was launched  
in 1982, but with such a powerful version of  
Basic, our very best documentation

Articles which are submitted to Dragon  
User for publication should be in one file  
1000 words long. All submissions should be  
typed. Please leave wide margins and a  
double space between each line. Programs  
should wherever possible be computer  
printed on plain white paper and be accom-  
panied by a copy of the program.

We cannot guarantee to return every  
submitted article or program so please take  
a copy if you wish to have your program  
returned you must include a stamped  
addressed envelope

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250 games to be won from those old  
winning, Inevitable Software

## Editorial

In days of old, so ancient myths tell, Dragons were solitary beasts, hiding  
away, keeping themselves to themselves, guarding their hoards of treasure.  
And I guess the same used to be with Dragon owners.

When you could nip into W. H. Smith to buy your favourite game, or pop  
into your local computer shop to check out some new peripherals. When you  
could ring up the manufacturer for technical advice, and repairs and spares  
were sure to come by in that mythical dim and distant past, Dragon owners  
could be as solitary as they liked.

And this is not the case at present. With the mail order trade almost  
taking over completely, things are no longer that easy for people with a  
Dragon, which is why events such as the 6809 show (and others) have  
taken on a new importance.

News is looking good on that front — a show in Cardiff this Spring, a  
follow-up to the Dragon weekend is currently being organised. Microdeal  
are organising two Dragon conventions for later in the year and Database  
Publications (who have taken over the 6809 show) seem keen to hold both the  
principal show (probably in Manchester) as well as a London event. You're  
almost spoilt for choice in fact.

However, this blossoming of events forms a crossroads in the destiny of the  
Dragon. If well organised and well supported, they could trigger a  
Renaissance for the machine — if the opposite occurs the Dragon will be  
well and truly relegated to the category of 'flea barn'.

The opportunity and enthusiasm are there — the rest is up to you.  
Answers on a postcard please....

## Show time in South Wales

IT'S 54000 times again — this time in Cardiff John Penn Discount Software and others have joined round to organise a show in South Wales — Cardiff Argos's be said — on Saturday 15th February. The show runs from 10.00 to 5.00 and entry will cost £1.00 for adults. 50p for the under 16s.

We feel it is important to have this show for Dragon Users, said Hugh Pwysen speaking on behalf of John Penn. With less and less retail outlets it is important to

get out and let the Dragon Users meet the people behind the Mail Order system — let the customers place a face to the voice on the phone.

Exhibitors include John Penn Discount Software, Computase Computers and Peripherals.

Also Design Design, Huby Computer Graphics, Gwynne for Software.

Anyone wanting further details (including potential exhibitors) should contact Helen Penn on 0222 5830.



## Extra Incentive

WERE YOU one of the eager arcade addicts trying to win the Scale Steady Go\* competition at the 8000 show recently? Well, incentives are pleased to announce the winner of the competition — a Mr Kevin Pains of Headington Close, Bevington. On the Saturday of the show Kevin walked his way to a score of 8000 — and for this effort gets a prize of £25. Congratulations!

Never let it be said that incentive software do not live up to their name. All purchases are of their Incentive release Alien Ghoul (based on that famous arcade game) will have automatic entry to a competition to win a sparkling new IBM Crtide arcade machine. You'll have to invest a few few

hours playing the game though a score of 30-5000 qualifies you for entry to the big prize draw. Go for it!



## Close up

ELECTRONICS enthusiasts everywhere have been waiting with bated breath for this one — the Pocket Inspection Microscope from Gobonic Limited.

These handy self illuminated pocket microscopes are second in price

long, and weigh in at four and one half ounces. Gobonic are producing two models, the Spring-90 (£19.95) which provides 50 power magnification and the Spring-100 (£27.95) which provides 100 power.

For further information write to Gobonic, 22 Llanfair Road, Gildford, Surrey GU10 3HW or telephone 0470 302020.

## Roysoft?

ROYCE ROY, author of the Jet Set Wily and Manic Manic Dragon comic books, is set to launch his own software label in the New Year. Called Roysoft, it will concentrate exclusively on high quality Dragon type software. The first two titles are both arcade adventures, one called Healer, the other The Tale of the Roy. Roy is suitably mystic now about the details of plot concerning these releases and their price, but expects both to be available around the beginning of February.

As well as programs penned under his own name, Roy also has plans to market third party software. I get a lot of letters offering other people's code

— but not writing any themselves! he said. "We're looking for programs! Whatever happened to Microdragon Pains? Enquiries to 25 Clonwy Road, Alton, Liverpool L81 6UN.

## Disk tool

DR HED Knachtel Software (no it's not a misprint) is a new German enterprise which generates disk as a company which only produces "good tools and utilities instead of worse games for the Dragon". They have just released their first product, Disk-Support Tool 1.1.

For further details, write (including a seal) to Bernd Knachtel, Software at Arnold-Williams 51, 9 5850 Remscheid 11, West Germany.



## Show time yet again!

FOLLOWING last autumn's successful Dragon Weekend in Wales, John Dragon User Jan 1986, Bob Morgan is organising a follow up event to be held at the Treflodon Hotel, Aberdovey in Gwynedd over the weekend of 21st & 22nd March. Events over the weekend planned are talks, demonstrations on a variety of

subjects including Modems, Interfacing, Eeprom, boxing, Operating systems — and much more!

The cost fully inclusive of accommodation and meals, will be £45 per person. Last year's event was oversubscribed so that anyone interested to book early. Contact by via the Mid Wales Tourist Centre, Merfyrhills, Pwys, SA20 8EE. Tel 0654 2664.

HERE IT IS! The 22 screen, 50 level, See Sawing, Frog Slurping, Lili Catching, Apple Munching, Mind Blowing, Eddie Guiding, Arrow Dodging, Mountain Jumping, Laser Zapping, Airship Gazing, Boulder Hopping .....

# EDDIE STEADY GO!



**NEW  
FROM INCENTIVE  
£7.95**

## PRIORITY ORDER FORM

Please tick the titles indicated below for my Dragon 3266 computer

**EDDIE STEADY GO!** £7.95 ☐

**Basic Trade (Eddie's first)** £6.50 ☐

**The Karl Trilogy of Adventures** £9.95 ☐

I enclose cheque/P.O. for £  or please debit my credit card no.

Name Address

INCENTIVE SOFTWARE LTD-54 LONDON STREET, READING, RG1 1SD  
Credit card telephone orders - Ring 0734 584476

# Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, Dragon Mail, 12-13 Little Newport Street, London WC2H 7ND

## Pokes Galore!

Here are some more coupons and pokes that I have discovered:

**INVADEVS REVENGE** — POKE 14718 in before typing EXEC where it is the number of lives from 0 to 255

**DONKEY KING** — 80000 LOADM to load POKE 12044 in before typing EXEC where it is the number of lives

**PLANET PROBECHN** — POKE 1408 in POKE 15045 125 for infinite lives

**SCARPHAR** — Load as normal POKE 3082 in gives 255 lives

**LUNAR POWER PATROL** — POKE 82918 in

**BOYS THE GOLD** — POKE 14411 in

**PLANETULAR ATTACK** — 80000 LOADM to load POKE 10738 in before typing EXEC

**CRAZY PAINTER** — Type programme A listed at the bottom of the page. When loaded POKE 9952 in where it is the number of brushes and pairs of paint to a maximum of 44

Then type EXEC 16284

**CUTHEART IN THE JUNGLE** — Type programme A to load

Then type POKE

11482 in EXEC 10384

**SPRAMELE** — Type program A to load. Then type POKE 7380 in POKE 7301 start stage number EXE4080

**CUTHEART CODE DRAGONG** — Type program A to load

Then type POKE

11485 in EXEC 4080

**HUNCHBACK** — Load the game as normal. When turning press the RESET button and type POKE

10384 in EXEC 36283

**TOUCHSTONE** — Load as normal and press RESET when asked one of two play on. Then POKE

10384 in EXEC 10384. The

slow down the generation of

new monsters.

**GALACTIC AMBLUSH** — Load as normal press RESET when you have entered the colour and speed. Load type POKE

14713 125 EXEC 12583. This

gives infinite lives.

**OGGARD ZAP** — Load to normal and press RESET during a game. Then type POKE

7041 12 EXEC 12583. This

gives infinite lives.

**LYNCH ASSAULT** — Type program B as listed at the bottom of the page. When loaded POKE 14718 in EXEC 704

**CUTHEART GOES WALKABOUT** — Type program B as below. When loaded POKE

15045 125, makes you infinite

to the information and POKE

12410 125 gives infinite lives.

Finally type EXEC 704

Infinite lives appears in stands for the number of lives which you would like and should be substituted for the number. It

ranges from 0 to 255 unless

specified.

I'm sure these pokes will be a great deal of help to many readers.

**Program A**

A=100 POKEA=140 POKEA

+1+ POKEA+2+ POKEA+3,

128 POKEA+4,100 POKEA

+5 80000 EXE40A

**Program B**

A=30800 POKEA=10 POKEA

A+5 150 POKEA+3 1+40

POKEA+5,134 POKEA+4 57

POKEA+5,103 POKEA+6 1

POKEA+7 100 POKEA+8

57 EXE40A

James Atkinson  
(Miss Paul Burges)  
18 Moorpark Road  
Sheffield S19 4QS

## Delta Dos

THE due to the damage of Premier Micro printers and not much information published by them. I really I notice a lot that may be useful to Delta DOS users.

If you wish to save a machine code program to tape, first use the (ask)up purposes the normal tape (poke) do not work.

First LOADM your program then 4 use POKEHIGH(100) 255+POKEHIGH(10) this will give you the start address of your program.

The end address can only be found by approximately as the DOS loads the whole classes of a program into memory and the address is therefore found by testing the directory to the length of the program in memory. This is then multiplied by 256 and added to the start address already found by the above method to give the end address.

The exact address on Delta DOS is always the start address. I hope that this tip

may help a few of your DELTA DOS users.

R K Osborne  
164 Northdon Avenue  
Cliftonville  
Kens  
C19 2AA

## Barons

HAVING just achieved a 100% score on completion of Barons of Calf V, my wife and myself would like to thank the following comments, some of which concern the game review of December's Dragon User.

- 1) A roll of wallpaper is not required to map the adventure. My wife produced a detailed map, undisturbed, using on a piece of graph paper 17" x 17". The map is complete with section symbols and is in colour.
- 2) With the aid of the map and some initial observations it is possible not to lose. Most ratings at every nightfall.
- 3) The problems do get harder as the game progresses, but with a little thought are solvable, especially at the end of the game.
- 4) As for the girl in the White City after several Tante Twists she will, but that is a problem for other adventures.
- 5) For a different way of the adventure by the following:
  - a) Don't load a saved character.
  - b) Repeat tape.
  - c) Fully load the saved character.

The results (found by not properly programming some tape) are guaranteed to give a good character!

- 6) Barons of Calf V is a super adventure which gives many enjoyable playing hours.
- 7) Finally, good of you 100% score at in the first map, which can be verified by Wintersoft and needs as follows:

Use the same strategy your viewing conscious not to fail through the transatlantic vortex.

It is continued in a continuation part 2. User of Barons.

Mike and Jill Boulton  
4 Barnhill Road  
Weston Super-Mare  
Avon BS24 7GN

## 6809 Flop?

WHAT a waste of time, effort and cash this year's 6809 game was.

After spending £25-30 on my last two and £100 in total I was totally disgusted to find that Tandy and Baby were the only titles with software for my Tandy machine, and none of the games on that Tandy that I had already got.

I know that Tandy have a right not to advertise but they were ridiculous. All I can say is that this is the first and last time I will be attending this show and for all Tandy games I can only hope things improve soon.

M Johnson  
26 College St  
Boschton Union  
Birmingham  
B15 7PD

## No go Show

THIS is the first time that I have written to you. I am writing to let you know of my disappointment over the latest show held this weekend. I attended both of the previous ones which every opinion were much more lively, informative and well attended.

During the show I entered early and left about noon when things were getting hectic with the usual long queues forming. This time the long queues and not really enough made to justify the entrance price of three pounds. In fact your magazine covers the latest products and developments much more thoroughly.

I shall of course continue reading your magazine and give the shows a go. Let's hope I can buy several more for the entry plus travelling expenses.

M J Foster  
43 Chertwode Avenue  
Wimsey H40 3SD  
Middlesex

Can you live by magazine show? Was the show that bad? Answer in a postcard please. ...

# THE DRAGON COMES HOME TO WALES

We invite you to meet the leading stockists of Dragon software, hardware and peripherals. Come and pick up some amazing bargains at the Cardiff-Wales airport on Saturday, February 15, 1986.

## BLADY COMPUTER GAMES

See our large range of software for the Dragon and Tandy, including many new games.

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Flex operating system, Dragon Plus and professional business software. Distributors of Dragon hardware.

## COMPUTAPE

The only software company to make your Dragon chips try not dry.

## DATAPEN MICROTECHNOLOGY LTD.

Datapen will be demonstrating their light pens and the new Dragon Draw software. Both will be available at special show prices.

## DESIGN-DESIGN

Meet the faces behind the name.

## ECLIPSE-FENMAR LTD.

Eclipse-Fenmar will be displaying TOTAL ECLIPSE. Come along and meet the master gamer himself, Veebo-Zogrod of Grogfax.

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## PEAKSOFT

Peaksoft are promising Britain's best deal on a wide range of joysticks, books and add-ons — including an incredible £100 discount on the Touchpad Graphics tablet.

**10.00 am-5.00 pm**

**Entrance fee: £1.00 (adults) 50p children (under 16)**

Show to be held in the Conference Room, 3rd floor, Cardiff-Wales Airport, Rhosce near Cardiff. For the Cardiff-Wales Airport follow the signs from the M4 and A46. Plenty of car parking available.

Half hourly bus service (No. 351) from Cardiff Centre.

Refreshments available in departure lounge.

For further details ring John Penn: Bordon (04203) 5970

# Communication

Send in your questions, requests, and plans to **Communication**,  
Dragon User, 12-13 Little Newport Street, London WC2H 7PP

*Communication* is defined by the *Extremely Small Pocket Dictionary* as the imparting or exchange of information — and this is what *Communication* in *Dragon User* will be all about too. As controversial technical and software support for our computer users we get ever increasing amounts of mail on a variety of subjects all asking for help and information — more than our *Supremo* Bore Gadge could ever handle. So this is your chance to reach every thousands of *Dragon* owners who might be able to help you — and of course if you can help someone — why not drop them a line?

## Shortage

As I am living in Norway I am beginning to feel the shortage of programs for the *Dragon Computer*. I am the lucky owner of a D84 double disk *Dragon D84* and some software.

I think I might be interested

in a second User of the G84. I want to use it in my work programs. We have some *Dragon* at school but we are now getting rid of them.

Please I want to go in touch with teachers who are using the *Dragon* in schools. Perhaps we can help each other in getting useful software for our learning.

Please send me a letter and we might get into action making exchanging software for educational purposes.

John Ege Haug  
PO Box 18  
N 2087 Rindvåg  
Norway

## Transformer

LAST Christmas I eventually received a *Dragon 32* computer. After two months the perspective had turned out. Unfortunately the computer was second-hand and out of guarantee. I have just read the letters page in the latest *Dragon User* to find that Touchmaster no longer stock it. Please could anyone tell me where to purchase a new transformer?

John Moore  
3 The Maltings  
Mummers  
Willy  
BA12 6AP

MY DDM has been the owner of a *Dragon* for over two years and has built up quite a collection of software and accessories. Unfortunately for the last six months his computer has been lying unused because we have been unable to purchase a transformer. We have written to various firms and visited computer repair shops, but as it is a needed unit we have had to succumb. Please please let me know if his computer will ever be in working order again.

Angela Seward  
Kensington  
Pulse  
Freetown

## Communication

Stuck for a routine? Need some obscure equipment? Feeling out of it? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (give it as brief and legible as possible) together with your name and address and send it to *Communication*, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

### Problem

.....

### Name

.....

### Address

.....

# Dragon User People's Chart

Power to the People: is our motto here at *Dragon User* — so this month (and every month!) we are now going to offer you the chance to air your personal preferences to the software producers by voting in the *Dragon User People's Chart*.

Ever since the majority of retail outlets ceased stocking *Dragon* programs (so that sales are now even more difficult to access) the *Dragon* score has indicated that one thing any self-respecting *Dragon* must have — it must have a *People's Chart* as useful thing if only to check to see if everyone else shares your good taste.

So, over with that water in mind, we are now inaugurating a *People's Chart* — for you to vote for your top five *Dragon* programs (games, utilities or applications) each month.

Aim just to make it that little bit more interesting this month's Microbit are offering £25 worth of software (of your own choice) to the winner of our illustrated program competition. Who said anything about it being a competition?

Well, to make it truly even more interesting, instead of just asking you to send us an envelope from your top three — the cleverest winning the goodies. Give it a try, you know it makes sense!

## This is what you do

Each month, *Dragon User* will be compiling its own special *Dragon*-software Top Ten chart — compiled by you!

And each month we will be sending £25 worth of Microbit software to the person who sends in, with their personal top five, the most original phrase or word which stands up to these letters (you don't have to use them all in the letters, all you top three programs).

You can still vote in the chart, without making up an envelope — but you won't be in with a chance of winning the prize.

All you have to do is fill in the form below (or copy it out if you don't want to damage your *Dragon User*) and hand it off to *People's Chart* No. 1, *Dragon User*, 12-13 Little Newport St, London WC2H 7PP.

## Chart One

Voting for *Chart* No. 1 closes at 1pm on Friday 18th February 1985. Answers received after that time will not be eligible for inclusion in this month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5: Voting Month 1

- | Name    | Address |
|---------|---------|
| 1. .... | .....   |
| 2. .... | .....   |
| 3. .... | .....   |
| 4. .... | .....   |
| 5. .... | .....   |

My phone is: .....



MOVE OVER POLE POSITION HERE!

# SPEED RACER



**NOW  
ON  
DISK!**

1 Joystick (optional)

Take your choice of  
controls, then race  
from the moment you  
press the Start

One wheel will give you  
the most fun  
- Dragon Gate



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Tandy version available at **TANDY** Shops  
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By phone **0726 66020**

By post to **MICRODEAL**  
41 Truro Rd. St Austell,  
Cornwall PL26 5JE



## MICRODEAL

# Show Business!

*He came, he saw, he did a little shopping — Jason Orbaum gives one man's opinion of the Third 6809 Show — his own*

OVER the weekend beginning the 21st of November 1988, some 7,000 people (as estimated by the organisers) found their way to the Royal Horticultural Halls, London (and I mean found: this was the first time that I have not become lost on the way!) for the third 6809 show.

On arrival I must admit to being a bit worried: as I often drive past the outside of the pavilion I have not quite noticed when I got inside. There was doubt to these: it had there was risk to break down! This situation changed quite fast though and by late morning there were a fair number of people buying, drinking, and playing.

Most of the firms one would expect were there (however Design Design (nominated to be due in a mix-up of dates), Cadix and Adventure International were notable for their absence (although the Scott Adams adventures were on sale from Computape).

So having had a brief, anonymous look round, and been greeted with an enormous display of handbooks from about 100, I got on my official Dragon User list and then set off to talk to various people in order.

## Microdeal

I suppose I had to talk to the game first. They were there with the usual suite of games displaying their latest and best games — one of which Shocktroop is reviewed elsewhere in this issue — and selling an incredible range of titles over three days.

As most people are now aware to achieve games from Microdeal you have to resort to mail-order. There is a very good reason for this, according to their director John Symes: "It is the only way for us to carry on. It is mainly limited on the fact that sales in general have declined for Microdeal. However, I am pleased to be able to say that my experience of Microdeal's mail order service reveals it to be very efficient (and).

These recent months they say has achieved a moderate success, and although profits have been low they have enabled Microdeal to maintain a very high public profile for themselves and the Dragon.

And the end of Microdeal has not been distant. They have been busy scheduling and putting for a "Dragon Convention". The convention would be very different from the shows such as this one which have been described by many as a form of "Dragon Owners Jumble Sale". The con-

vention would be in London or Manchester most probably, and Tandy amongst other firms have pledged their support. The convention would feature lots of stalls, but would exclude gamestakers, and indeed the event could well be an evening affair as a result.

As for what is new on the games front, Microdeal have acquired the rights to a number of several months ago. *Scramble*, *Advent*, and are planning to release a new *Adventure* (I like that last adventure have a very long shelf life). John Symes agrees: The *Vortex Factor* plus a 3-D *Scramble* which is not only cheaper, says they, but BETTER than *Homemade* *Flavours*, and a game entitled *Acquasud 47*.

John also pointed out to me that at the back of BYTE magazine one can find adverts for the Dragon computer "from the BBC". Hence the plot thickens!

In all, Microdeal's attitude to the Dragon is VERY optimistic and extremely real.

## Camata

Camata now offer Dragon Dos with four disk drives rather than Gelle-Dos, but I was unhappy to find that this is not the Dragon Dos in fact. Camata Dos (as it is called) is only "compatible" with Dragon-Dos, whatever that means.

Camata continue their after sales support through their Gainsford office, and sell other drives up to a double drive, double sized HD track, Double Density configuration.

## Incentive

Incentive had enjoyed a very good show with *Code*, *Steady Go*, selling well and the *Kid*! They enjoyed a continued steady sale of *Microdeal* (I have no reasons for not attending the first show to launch) promote their game, *Steady Go*, which, I learned from Nicholas who produces the arcade game with the same name, should be available in January or February.

Incentive were offering a twenty five pound prize to those who put up the best sales of the extension *Code*, *Steady Go*! I don't have the heart to win it!

They pledged continued support for the Dragon, provided upon sales of *Micro*, *Code* (yes, it sounds a bit dodgy to me too).

## Bibby

Bibby felt that the show had gone extremely well although they felt that from about 2.30 onwards on the first day a bit of a

disappointment (a feeling echoed by many of the other firms present).

They were interested in how sales would go through winter and were upon a release *Steady Go* (the sequel to the superb *Oversea of Chess* based locally around the Spectrum game called *Lunar Jetson* and version of *Chess*). Some of the other new releases to be reviewed here include a *Kung-Fu* game (the first of three I received at the show).

Bibby were an exceptionally open and friendly company who had most of their programmers present at the show and were quite happily chatting with anyone who came to the stand, not just reporters. They told me that *Coolest Commander* was written without an assembler (a hand-coded — someone gave the programmer immediate entry to the Microchim Club of Great Britain).

## John Penn

John Penn described the show as: "the best we've been to yet". As many people knew they have bought up all of Webster's old stock and are selling great amounts of software at a great discount including *Atomic* (lower at low prices). The company's policy is one of continued support of the Dragon whilst looking at other computers.

## Computape

Computape were the most pleasant people I met all day. Their enthusiasm and love of the Dragon together with their sense of business acumen, made them a firm which deserves and will get support.

Computape described the Saturday as being the *big day* as, although a lot of sales and enquiries. They are also trying to run a game show, the one in Worcester which they have support from, among others, John Penn, Peacock, Wintrop, Grosvenor software and Computape.

They are now the sole supplier of *Code*, *Software* and they have the license to a game called *Alpha Monitor* (reviewed above) and the infamous *Madness* and the *Micro*.

These enthusiasts came from the fact that their latest main aim originally is *Dragon Owner* (which will be a great achievement, he knows what he wants to sell) because to know what he likes to play! Computape were also presenting *Adventure International* at the show selling a good number of the Scott Adams adventures on

the Dragon. Asked if they would continue their support of the Dragon they had one word - Absolutely.

### Quickbeam

Sales of Quickbeam's software were apparently down on 1000s of last year, but they promised continued support provided sales of their new games are high (I'm afraid that somewhere before).

Their latest releases are 6809 Express and the soon to be released Shootin' Master - a Kung Fu game along the lines of that which is very popular in the arcades (the only which involves death). Advanced owners of Shootin' Master at the show expected sales of 6809 Express and both will be reviewed soon. The Disk version of Shootin' Master (Dragon-Dos only). Car

I will include speech. Quickbeam were quick to point out that they are open to any data software being written by Dragon programmers and offer a 20 per cent royalty scheme across the board.

### Wintersoft

Wintersoft had found the show much better than the last in terms of sales, which they felt was due to the launch of the new game, Just-a-Roadster. They say that they will only now on only be present at shows if they have new projects to exhibit. They have no plans at the moment except to continue supporting the Dragon and will be releasing a number of new (the second part of Just-a-Roadster) soon. The plot will

take over after the crossing of the Just-a-Roadster to a land of magic. This adventure will be more along the fantasy line than the last of Just-a-Roadster.

### Compuserse

Compuserse had found the show much quieter than last year but had done about the same amount of business. Their main aim was their Dragon Hard Disk system incorporating 80 columns and 128k expansion which will retail for about a £1500 (which is actually very very cheap for the product). The expansion runs with Eddie and does not need a 1k, although it is available.

The storage of a single hard disk is the equivalent of 25 double 5 1/4 disks and the system is also just four times faster! The driver software contains an event/IO and RAM and may include a timer.

To give some idea of the economical pricing of this and Compuserse pointed out

that to buy just the hard disk part of the expansion for the 6800 would cost a £1500. The unit, by the time you read this, will be available for both the Dragon II and the 50.

Amongst the many others displaying were Amstrad/Compuserse who were showing the excellent Electronic Author word processor and were presenting a new game. There were also various companies selling Data T-Shirts. Books are at low prices - there were certainly really good ones to be had.

The general mood of the show that was one of excitement and a number of people said that the first show could well be the last. This I feel was a bit a great shame as the 6800 show is one of the things that has helped to keep the Dragon alive.

I Dragon owners wish to ensure a prosperous future for their machine it is up to them to attend the shows that provide the life blood for the machine. Put on the next one!

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# Taking the tablets

Renaissance man **Mike Gernard** takes some time off from adventuring to try out the Touchmaster Touch Tablet

NOT MOST PEOPLE will know Touchmaster as the name of the company that rose out of Dragon Data's ashes with the intention of providing software and support for our dearly beloved computers, and Touchmaster is also the name of the Touch Tablet now available for the Dragon as well as several other models. But don't just take a quick look at the incredibly detailed and colourful graphics used in the exquisite ads to illustrate what can be done with a Touchmaster as results like that are achieved without hours of painstaking effort.

A Touch Tablet is simply a pressure-sensitive pad which attaches to the computer, and on making contact with this with the appropriate pen/stylus the results can be seen on screen and also normally saved to disk or tape. This is allowing non-programmers (and even programmers) to produce the graphics they want without resorting to a long list of the computer's own BASIC graphics commands. Most Touch Tablets have a featured mode allowing you to simulate a screen (a your home's content) while along top bottom or side of the actual drawing screen on the tablet will run a list of the commands and colours available, each of these again accessed by a touch of the pen.

Touchmaster itself comes well packed in the lovely styrofoam box and as well as the pad you get a stylus, interface board, forms, just covering, Multiquad cassette and appropriate manuals. If you can call eight or 12 pages a manual, the Touchmaster is scarcely bigger than a regular three pin plug and with the interface plugged into the pad and the Dragon's cartridge port, you're away. The interface is made up of a lengthy length three foot ribbon cable and the connection also has an expansion bus duplicating the cartridge slot which has been slightly modified to work with both Dragon and Premier drives connected.

The stylus is simply a plastic pen with a rounded end, though as fast pressure can be applied with almost anything that won't damage the pad or any overlays being used. Better stick to the stylus while changing commands and if used the top of a ball point pen for this, using the writing end might have had rather disastrous results.

Documentation is one of the package's

downfalls, as the Touchmaster User Guide is a small 12 page booklet covering all minutiae and spent most of the time on a few lines on taking care of the hardware. All you get is one single program which prints the co-ordinates on screen when you touch the pad with the stylus.

The User Guide for the Multiquad software provided is better, but still leaves room for improvement. The opening page for example tells you that "Most master pieces can then be saved on tape or disk to be incorporated into your own programs later. Unfortunately it doesn't go on to explain how to do this, and as such if your multi-quads are saved in a machine code program, the average BASIC programmer will be at a loss as to how to incorporate these instructions about the various commands such as LINE and SQUARE are also minimal — the kind of instructions where once you're experienced for your self to get the hang of things, you then understand what they were trying to tell you.

To use Multiquad you'll need your Dragon manual by your side. Unless you know by heart the various MODEs and colour sets available. You'll first select the MODE you wish to work in by pressing the MODE box followed by a number from zero to four, trying not to be put off by the weird things that happen to the screen while you do so, though if you want really weird results try working in the allegedly non-existent MODE 5. Finally, when all that you select a PAGE for the start of the

graphics screen, followed by whichever of the two available colour sets you want for the chosen MODE. After that you're away.

You can clear the screen to whatever background colour you want, and then work in the other available colours (well you can draw in the background colour if you wish, but don't ask me to peer at the results). Colours used obviously match the colour numbers on the Dragon, and beneath the box containing the nine colours numbers, and the one for MODE PAGE/Colour Set is also offering nine types of brush styles. These are a simple point, a circle, square or rectangle and a choice of lines of five different widths. The width of these can be adjusted by pressing a number box 1 thru the colour you want to work in. Using the same box for colours and numbers can be a little confusing, as your last press can result in two successive colours, negating, meaning you'd be working in the colour that happens to be the same number as your brush width and you have to resort to the COLOURS box to withdraw the commands and start again.

In addition to finishing you can also produce various set shapes. These being a line, triangle, rectangle, circle, ellipse, polygon and polygons. They can be any size and are easily obtained by setting one or two corner points on the screen, then moving the stylus point around the screen till you are the exact result that you want. Any command can be taken back using COOPS and nothing is set in the picture till you confirm it with ENTER. The FILL command will put any available co-



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per made any continuous border and this has two drawbacks. One is that in freeshoot mode the pen has to be pressed very firmly along the design to obtain a continuous line, and so it is quite easy for the occasional pixel not to register, which you can't easily spot on the screen. Until you try to fill the shape and the colour blends out to go looking for another border at the appropriate colour. The results result in the whole screen being filled COBOL. The second drawback is that you can't fill a shape which has borders of contrasting colours, but that's not exactly a disaster and you can get round it with a little effort.

Other commands not yet covered are those for SAVE and LOAD. TAPE and DISK, all these being well prompted, while the CLS to clear the screen is guarded with an option for you to COBOL or GO on to choose the colour of the new screen.

So far so good, or reasonably so, but Touchmaster does have problems, mostly to do with the actual sensitivity of the pen. As mentioned before, pressure on the stylus has to be pretty firm, and this does inhibit the freeshoot drawing somewhat. The other occasional problem I had was in the program hanging up on the Sometimes in freeshoot mode, wishing to capture the latest set of artistic master for posterity, there would be no click when I tried to press ENTER in fact I couldn't. COBOL, CLS, SAVE or anything. Once eventually the reset button returned me to the program with part of the masterpiece preserved in memory. I thought sometimes it required a reload of the multipage program.

These are mistakes, but as long as you SAVE your work in progress regularly, and don't mind having to make several attempts to get the results you want, Touchmaster can produce very effective graphics. The best I found being the impressionistic freeshoot efforts. Though you will have to lay in a goodly supply of grip paper or some kind for the best planned results. It's expensive and its fault's annoyed me, but I must admit that after a few hours I was becoming very pleased with the graphics appearing on

screen.

Of course you don't need to use *Multi-press* with Touchmaster, because Touchmaster Ltd has produced a range of software that makes use of the Touch Tablet's facilities, some ten of them (five being available to the Dragon. Our review cannot have been mainly educational, a fact which are no doubt putting the kinks to its bed, but you can also get *Graphic Design*, a graphics adventure called *Perseus Chase* and *Perseus Strategy* game. *Strategic Command* — Normal is the software house behind Touchmaster, incidentally, and this is inevitably reflected in the retail software available.

*Strategic Command* seemed to gain little by being linked up to a Touch Tablet, particularly as the software is packaged in large plastic boxes. This is one way of dealing with the 11" x 8" overlays needed, but when unpacked they become almost impossible to lay flat on the tablet, unless you've got a handy steamroller to press on top of them for a few days. I certainly wouldn't buy Touchmaster just to play games on, as this is more of a novelty use than a practical one, and I was much happier playing the boring old un-

#### Touchmaster's Strategic Command

Where this package does come into its own, though, is in its use for young children who aren't yet ready to cope with a confusing keyboard. There are five educational packages designed to test observation memory shapes and colours. *Simon Says* is really a Colour-Shape-Game, but a selection of eight colours, and so, and then the child can choose to have various features on the test (change any number between one and eight, and he or she must remember the sequence. It would be an amusing animation of finding a cat.

*Simon Says* shows you a completed shape on the screen of eight, 12 or 16 shapes, according to the level selected, and when this is broken up the child must recreate the picture a shape at a time by matching on the overlay the shape that is flashing on the screen. Graphics on this are very nicely done, and it's a game both appealing and educational. *Simon's Shapes* presents an overlay showing eight different shapes and six colours. On the first level the child must simply match a shape on screen with one on the overlay, and on the second level both shape and colour must be matched. Third level is back to matching shapes, but this time it entails creating a picture.

*Simon's Squares* and *Simon's Shapes* roughly follow along in the same vein — I would say that the programs are definitely of some educational value.

So what about the system as a whole? At the original price of £149.95, the Touch Tablet was an expensive piece of equipment — certainly not an impulse buy. But at the present price of £52.50 (including five programs) comes into the casual buying price range for someone looking for new avenues to explore on their Dragon. An endorsement.

**Hardware:** Touchmaster Touch Tablet. **Price:** £49.95 plus £3.00 postage and packing (first order only). **Supplier:** Touchmaster Ltd Ltd, 41, Dagen Industrial Park, Dagen, Port Talbot, West Glamorgan, SA12 7DU. Tel: Dagen Ferry 620310.



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# The Third Dimension

An introduction to three-dimensional graphics

by Peter Whitaker

IN THIS article we take two-dimensional graphics (Dragon User December 1985) one dimension further. The DRAW command in the context of a co-ordinate-based system using the LINE command to join the plotted points together. To extend this technique into the third dimension is really quite simple. First we must modify our matrices to include the extra dimension, and then we must derive an equation to translate the three-dimensional co-ordinates into two-dimensional points on the screen. We'll follow with the matrices used for interpolating an object in three dimensions first, and then go on to something approximating the translation to screen display.

Table One shows how to calculate the object's new position after being transformed by a matrix. The co-ordinate system (X,Y,Z) is multiplied by each column of the transformation matrix. The total from each column of multiplications will be the new co-ordinate value. Table Two gives us the basic matrices we will need to move objects through three dimensions.

Using One shows the derived equations to rotate a point about its centre. Because the program line counts the number of co-ordinates in the object, we can change the data statements, and the program will happily move tanks, aeroplanes, or any other object around the screen from a REM in Lines 330 and 340, and the program will change the plotted point to a tank REM in Lines 360 and 370 and the program will rotate a plane. If you want your own data files, they must be terminated with a 999 to indicate that the last co-ordinate has been read.

## Matrices

As with the matrices used for two-dimensional graphics, two or more matrices can be multiplied together to give more complicated movements. It is very important to make sure that the matrices are multiplied together in the correct order, because if they are not then they will produce a different net movement than that which is desired. Each row of the first matrix must be multiplied by each column of the second matrix (see Table Three). Listing Three is a program for multiplying matrices together. When the values are entered for two separate matrices, the program will print out the values for the new combined matrix. Table Four shows how two rotation matrices can be multiplied together and the resulting equations can be inserted into the program. Change Lines 330-340 to:  $XT=X*CC+Y*SS+Z*SS+Z*CC+SS$   $YT=Y*CC+Z*SS+X*CC+Z*SS+SS$   $ZT=Z*SS+X*SS+Y*SS+CC+Z*CC+CC$  and the program will now rotate about both

the X axis and the Y-axis together. However, these three-dimensional matrices are based around the origin (0,0,0). If we move the plotted matrix from the origin (put a REM in Line 320) and use the DATA from (see 340) then it will rotate in orbit about the origin and not about its own centre. If we wanted it to still spin about its own centre, we would first have to move it back to the origin (this code is said then move a blank end again. Change Lines 330-340 to:  $XT=X$   $YT=Y+CC-Z*SS+Z*CC+SS+SS+SS$   $ZT=Z+Y*SS+Z*CC+Z*SS+SS+CC+SS$ ). This will now rotate the plotted matrix about its own centre, without it orbiting the origin.

## 3-D Movement

Now that we can successfully move objects around in three dimensions, we need to be able to convert the objects position into the screen co-ordinates, without losing the depth perspective of the three-dimensional object. To simplify calculations, I have locked our viewpoint on the Z axis, looking directly towards the origin. If we wanted to view the object from a higher point, the result would be done by keeping the eye in the same place, and moving the object down. Similarly, we can appear to

orbit around the object by rotating it in the opposite direction. Fig Four shows how by remaining on the Z axis we can then calculate the screen position of a point from its known three-dimensional location. In the diagram, X represents the X displacement of the object from the Z axis. If we draw a line from the point to the eye (the point X) and extend the point on the screen which will appear identical to the point X. We know the distance from the origin to the screen is 40 units, and so the distance of X from the screen will be  $40/X$ . If we call the distance between the screen and the eye "D" then we can derive the relationship:  $X*(D-20)/(D-20+40)$ . Rearranging the equation we get:  $X=(20*(D-20)/(D-20+40))$ . Finally to give some control over the size of the drawing, we include a scaling factor, and offset the origin to the centre of the screen before drawing the pixels to the screen:  $X=(120+24.000*(D-20)/(D-20+40))$ . Similar calculations lead to the equation:  $Y=(21-24.000*(D-20)/(D-20+40))$  for the Y co-ordinate. By experimenting with the screen at 20, 40, and the distance of the screen from the origin (40) to see the effect this has upon the illusion of depth.

Although the program works well, it is quite slow. The pyramid moves slowly, the plane moves slower, and the tank moves

$$\begin{aligned} (X,Y,Z) &= (X,Y,Z,1) * \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & k & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \end{aligned}$$

$$\begin{aligned} X &= (X,Y,Z,1) * \begin{pmatrix} a & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} = Xa+Yb+Zc+d \\ Y &= (X,Y,Z,1) * \begin{pmatrix} 0 & a & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} = Xa+Yb+Zc+d \\ Z &= (X,Y,Z,1) * \begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} = X+Y+Z+d \end{aligned}$$

Table 1 - Matrix Multiplication



Model	Price	Memory	Processor	Storage	Expansion	Comments
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Model 200	£1,800	32K	8080	200K	4	Enhanced system
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Model 400	£3,200	128K	8080	800K	16	Professional system
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Model 600	£5,000	512K	8080	3,200K	64	Enterprise system
Model 700	£6,500	1,024K	8080	6,400K	128	Super system
Model 800	£8,000	2,048K	8080	12,800K	256	Ultimate system
Model 900	£10,000	4,096K	8080	25,600K	512	Ultimate system

Model	Price	Memory	Processor	Storage	Expansion	Comments
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even slower still. This is because of the increasing amount of number crunching required as the number of co-ordinates required to draw the object increases. It is not possible to speed up the program without introducing machine code. Hence, as the number of co-ordinates increases, the object moves much faster. Listing Two will spend a tank around the screen giving perspective views from below and above at 45 degrees to the screen. (Drawn in Lines 415 and 428) to change the tank for a plane.) When RUN, the program will display an option list and wait for a response. Press <G> and then go and have a cup of coffee whilst the program number crunches for five to ten minutes.

The program will calculate all the screen co-ordinates needed to draw the moving object and then save them in the protected memory above address 20000. If the program does not crash due to the object moving out of range of the screen display the program will return to the main screen once the memory reserved for data has been filled. In this case the data can now be saved to tape by pressing <S> or run by pressing <R>.

When the <R> option is selected the program will display the tank, spinning around the screen. Each tank is drawn on graphics pages ten to eight, and once completed is copied to the display screen. Because the program made the screen

co-ordinates from memory, and has very little number crunching to do the tank will move quickly with little pause between each successive picture.

If the <S> save option is selected the data is saved along with a count of the number of co-ordinates in the object. When labelled <L> the count enables the program to run data from any object with any number of co-ordinates without having to enter the number of co-ordinates separately.

Unlike Listing One which used an updated array system to calculate co-ordinates, Listing Two needs the data from data statements. This reduces the complexity of the program required to manipulate the objects, instead the matrix values are constantly updated and the coordinates recalculated.

## Perspective

Finally there is a third approach we can adopt to the study of three dimensional graphics. Instead of moving tanks and jets around the screen we can generate symmetrical objects such as wire glasses by rotating a shaped line through 360 degrees. RUN Listing Four and the computer will generate a perspective view of a wire glass. When prompted for rotation angles, enter values between minus three and plus three. The program works by rotating the line co-ordinates into an array. These are then rotated through 360 degrees around the Y-axis in 25 steps. The program keeps track of the current line, and the last line, in the arrays COLDX (1-3) and

ROTATEX (1-3). The three dimensions at co-ordinates of the new line are used to calculate the parallel co-ordinates for the perspective view which are stored at ROTATEX (1-3). The program then plots each of the COLDX and ROTATEX (1-3) co-ordinates plot as a line and displays the new ROTATEX. Then the ROTATEX (1-3) plot is rotated into the COLDX array and the next line is calculated.

It is possible to change the perspective calculations to include scaling or to put a loop into the program to spin the glass about the X axis or the Z axis. Any such alterations must be made to the perspective calculations only (Lines 415-428). The rotation calculations (Lines 429-445) must not be changed. At the glass stage will be destroyed. The glass shape can be changed by altering the data statement in Line 429. As with all the programs, this data statement must be terminated by a 999 to indicate the end of the co-ordinate data. The only problem we are left with is the "Norton Color" type of display. There are times when it is not possible to tell whether the glass is pointing towards us, or away from us. Although there are some visual clues from the relative sizes of the near and distant parts of the glass, the eyes are often fooled. This is a problem common to all symmetrical wire frame models and can only be solved by the use of "hidden line removal" techniques. These I leave to you to work on.

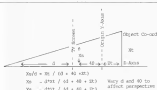


Table 1: Matrix 1: Data for Listing Two

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# Donkey's Tail

*An old family favourite brought to you by Brian Hinson*

NOW THAT the extremely late summer has been forced to depart and we are all huddled round our computers with our loved ones, I thought it was about time we had a really easy game that everyone can play. (Well anyone who can use a joystick.)

Granted, and the toddlers should be able to manage this one. But it will take you a bit of work to get it ready, especially if you want it to be attractive to visitors around an I/O-free dark February evenings.

You will need a drawing in PMODE 3 of a donkey, some form of instructions, and the main listing. Now there are several ways of achieving this:

1) I have provided full listings here that will allow you to set everything up as I have designed it.

2) If you have *Artex* as published in *Dragon* Clear in April 1986, you will be able to produce your own machine code program from a donkey you drew yourself.

3) If you have *Zippo* as published in *Dragon* User in October 1985 you can produce your own life pages.

4) You may have another means of producing the donkey and/or life pages.

From now on I will assume you are using my listing, but will add notes as appropriate for those who are not. When all the listings are completed and recorded on to tape in the right order the following will happen: type CLDAD and the START program will load. Type RUN and a new bar of the Donkey keyboard will play followed by the display of the first life page whilst the DONKEY graphics are loaded. The second life page will be displayed whilst the next program loads. Type RUN when the OK prompt appears.

This will display a Donkey standing in a field of green. The animal moves to a random position where it is seen for only a moment. You see that green is a tail coloured red, yellow or blue, which you move using the eight joystick, to where you think the Donkey's bottom is. Press the button and see how close you are! The Donkey re-appears with the new tail. Press the joystick to let the next player and press R for a new tail of the next colour. The blank green screen is displayed with the new tail to be positioned.

When you want the Donkey to find a new place to hide press the SPEAKER. All screens are displayed and you start all over again with the Donkey appearing in a new random position.

But that's all in the future — for the present let's get down to business. Get your

editor to type in the START program listing and save it near the beginning of a blank tape.

Next you need an introductory title page. I offer you Listing 1 which will create and save a machine code program to display basic information on the test screen whilst your Donkey graphics load.

Now you will need a Donkey! If you like you can draw your own donkey in the rectangle defined by (0:60) = (114,175) if you are using ARTIST (see the program as normal but before running I will use CGRAW: goto to read 9910 CGRAW: DONKEY 1030 7675 1030

RUN and set up the PMODE 3; SCREEN 10 with a green background. Before you actually start to draw press BREAK and put in the following about command: LMS (0:60) = (114,175); PSET; 8 SCREEN 3:CONT. You will now be able to see exactly where your Donkey must be drawn. (Place the donkey

to the left.) When ready put the tape in your cassette and proceed with the "SAVE" routine.

Alternatively you can use the Graphics listing to create a machine code program and save it after the first life page. The program given provides in Line 310 a means of checking all the programs on the tape so far by including SAVE. If all is OK the Donkey picture is saved.

Now all that remains is to type in and save the main program. Note that this must be saved with the name PINTAIL, so that it will be automatically loaded by the START program.

Record the tape, plug in the right cassette, type CLDAD and when the OK prompt appears type RUN. Sit back and watch the screen's change as the programs load. Again type RUN when the OK prompt appears and see how close you caught that tail to its correct location. No cheating is allowed and any arguments about where the tail should be will be settled by MUSE!

## START .

```
10 CLR = WORDS 400
20 CLORDM = MED
40 CLEAR500
50 PCLEAR0
60 DIM H (400), T1 (10), T2 (10)
70 C=4
80 PMODE3, L : PCLS
90 CLORDM 'DONKEY'
99 CLORDM 'NEED' : GOSUB 600
100 CLORDM 'PINTAIL'
400 'RANDOM END
410 FOR A=1 TO 9
420 READ A# : PLAY A#
430 NEXT A
440 RETURN
500 DATA 103000PL30PS, L4000PA, L4000PA
510 DATA 04L300CL4000, 03L70000L30PA
520 DATA 03L300L3, 0L000L20PA
530 DATA 04L6000L80L3000
540 DATA 03L400CL4000MED
```

```

10 CLS
20 FOR A=1934 TO 1938
30 READ B : POKE A,B
40 NEXT A
50 MOTOR ON
60 SOUND 254,1 : KE=INKEY$
60 IF KE=" " THEN 60
65 MOTOR OFF
70 GOSUB "HDS",1934,1935,1934
80 END

1934 DATA 154, 154, 154, 154, 154
1935 DATA 154, 154, 154, 154, 154
1936 DATA 154, 4, 15, 14, 11
1937 DATA 5, 25, 154, 154, 154
1938 DATA 154, 154, 154, 154, 154
1939 DATA 154, 154, 239, 239, 239
1940 DATA 239, 239, 239, 239, 239
1941 DATA 239, 239, 239, 239, 239
1942 DATA 239, 239, 239, 239, 239
1943 DATA 239, 239, 239, 239, 239
1944 DATA 239, 239, 239, 239, 239
1945 DATA 239, 239, 239, 239, 239
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1999 DATA 239, 239, 239, 239, 239

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10 PCLAMP = 1: PMODES,1
20 PCLA = ROMBER,1,0
30 FOR A=0 TO 636
40 READ S,C
50 POKE B,C
60 NEXT A
70 FOR B=1 TO 26
80 Y=RD(150)+36
90 X=RD(150)+146
100 IF Y=640 THEN X=X-120
110 FOR A=1 TO 3+INT(Y/60)
120 COLOR RND 150+1,1
130 IF Y<160 THEN Y2=0
140 C=RND(120)-10
150 IF Y<160 AND Y<120 THEN Y2=2
160 IF Y<120 AND Y<140 THEN Y2=4
170 IF Y<120 AND Y<180 THEN Y2=6
180 LINE (X,Y) - (X+C,Y-Y2-3),PSET
190 NEXT A,B
200 CLS : PRINT "SET YOUR TAPE UP TO <PLAY> WITH YOUR <DOMEYE>
TAPE ALREADY CONTAINING 'NEO'"
210 GOTO 150
220 CLS2 : PRINT NOW SET THE RECORDER TO <RECORD> .PRINT "PRESS
<R> WHEN READY"
230 K=INKEY$: IF K=K THEN 230
240 GOTO 150
250 END
1000 DATA 3714,3,3718,192,3746,3,3747,240,3776,3,3779,112,3810
,3,3811,112,3842,3,3843,112,3874,3,3875,112,3904,15,
3907,112,3938,63,3939,127,3970,255,3971,129,3972,192
1010 DATA 4002,213,4003,95,4004,192,4004,213,4005,87,4006,192,
4007,3,4008,223,4009,87,4010,192,4011,3,4012,95,4013,
213,4014,240,4015,19,4016,95,4017,87,4018,240,4019,
13,4020,87
1020 DATA 4103,87,4104,232,4105,61,4106,85,4107,85,4108,232,42
23,85,4224,85,4225,85,4226,95,4227,245,4228,85,4229,
85,4230,95,4231,192,4232,245,4233,85,4234,85,4235,95
,4236,192
1030 DATA 4320,3,4321,253,4322,85,4323,85,4324,87,4325,192,432
2,15,4323,93,4324,85,4325,245,4326,87,4327,192,4328,
13,4329,95,4330,95,4331,213,4332,87,4333,255,4334,63
,4335,87
1040 DATA 4410,253,4411,85,4412,87,4413,255,4414,240,4415,63,4
416,87,4417,85,4418,85,4419,85,4420,85,4421,253,4422,85,4423,
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4429,15
1050 DATA 4513,87,4514,213,4515,85,4516,85,4517,87,4518,255,45
44,3,4545,85,4546,213,4547,87,4548,213,4549,85,4550,
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3,4559,85
1060 DATA 4600,213,4601,95,4602,245,4603,95,4604,232,4605,63,4
606,95,4607,192,4608,213,4609,233,4610,85,4611,210,4
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1070 DATA 4641,211,4642,255,4643,213,4644,245,4645,95,4646,85,  
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80,85,4681,117

1080 DATA 4682,85,4683,95,4705,255,4707,41,4708,93,4709,95,47  
0,85,4711,85,4713,85,4713,125,4714,85,4715,87,4716,1  
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745,93

1090 DATA 4746,85,4747,85,4748,132,4771,15,4773,87,4773,85,477  
4,85,4775,85,4776,85,4777,95,4778,85,4779,85,4780,24  
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9,87

1100 DATA 4810,85,4811,85,4812,113,4835,3,4836,87,4837,85,4838  
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,4847,3,4848,87,4849,85,4870,85,4871,85,4872,25,4873  
,85

1110 DATA 4876,85,4878,85,4879,93,4899,3,4900,87,4901,85,4902,  
85,4903,85,4904,85,4905,85,4906,85,4907,85,4908,93,4  
931,3,4932,85,4933,85,4934,85,4935,85,4936,85,4937,8  
5

1120 DATA 4938,85,4939,85,4940,93,4963,3,4964,213,4965,85,4966  
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4976,213,4977,85,4980,85,4980,85,5000,85,5001,85,500  
2,85

1130 DATA 5003,85,5004,95,5026,213,5029,85,5030,85,5031,85,503  
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5,5042,87,5043,85,5044,85,5045,85,5046,85,5047,85,50  
48,87

1140 DATA 5052,245,5093,85,5094,95,5095,85,5096,85,5097,85,509  
8,85,5099,85,5100,87,5124,245,5125,85,5126,93,5127,8  
5,5128,85,5129,85,5130,85,5131,85,5132,87,5136,63,51  
37,85

1150 DATA 5138,93,5159,85,5160,85,5161,255,5162,85,5163,85,516  
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5194,85,5195,85,5196,87,5220,63,5221,85,5222,93,522  
3,85

1160 DATA 5224,85,5225,255,5226,213,5227,85,5228,87,5232,93,52  
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,85,5240,87,5244,51,5245,213,5246,129,5247,245,5248,  
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1170 DATA 5250,213,5254,85,5255,87,5256,85,5257,213,5258,125,5  
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45,13,5349,213,5350,122,5351,189,5352,85,5353,255,53  
54,245,5355,85

1180 DATA 5356,87,5359,13,5361,245,5362,122,5363,173,5364,95,5  
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14,132,5415,175,5416,245,5417,255,5418,245,5419,85,5  
420,95,5444,3

1199 DATA 5445,117,5446,126,5447,171,5448,234,5449,176,5450,26  
5,5451,85,5452,93,5476,3,5477,117,5478,94,5479,178,5  
480,234,5481,170,5482,245,5483,85,5484,124,5500,3,55  
69,245,5519,94

1209 DATA 5511,170,5512,179,5513,179,5514,253,5515,85,5516,112  
,5541,83,5542,94,5543,179,5544,179,5545,179,5546,129  
,5547,85,5548,112,5570,53,5574,124,5578,179,5579,179  
,5577,199,5578,191

1219 DATA 5579,213,5580,112,5605,33,5606,118,5607,235,5608,251  
,5609,255,5610,191,5611,213,5612,112,5637,83,5638,11  
5,5639,245,5640,83,5641,3,5642,179,5643,213,5644,112  
,5645,53,5670,112

1229 DATA 5673,3,5674,234,5675,245,5676,112,5701,83,5702,127,5  
704,255,5707,245,5708,124,5709,61,5734,85,5738,235,5  
739,245,5740,82,5745,13,5746,95,5779,43,5771,245,577  
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1239 DATA 5792,92,5803,19,5803,245,5804,92,5829,13,5830,95,583  
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926,213

1249 DATA 5931,253,5932,87,5938,213,5943,255,5944,87,5948,213,  
5979,255,5994,87,6022,213,6027,83,6028,87,6054,213,6  
059,43,6060,87,6063,192,6066,213,6071,63,6072,85,609  
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1259 DATA 6119,192,6123,15,6124,213,6125,112,6150,213,6151,192  
,6152,15,6156,213,6157,112,6162,223,6183,192,6187,15  
,6188,213,6189,112,6213,3,6214,223,6215,192,6219,15,  
6220,213,6221,112

1269 DATA 6245,3,6246,95,6247,192,6251,12,6252,213,6253,112,62  
77,3,6278,92,6283,15,6284,247,6285,249,6309,3,6310,1  
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348,247

1279 DATA 6349,192,6373,3,6374,127,6375,3,6389,247,6391,192,64  
00,15,6406,127,6411,3,6412,247,6413,192,6437,13,6438  
,137,6443,3,6444,247,6445,192,6449,13,6478,112,6479,  
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1289 DATA 6477,192,6501,13,6502,112,6507,15,6508,247,6509,192,  
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64,249,6571,43,6572,245,6573,192,6597,83,6598,192,66  
63,68,6664,245

1299 DATA 6665,192,6699,255,6699,192,6692,15,6693,255,6694,247  
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1309 DATA 6700,195,6709,249,6709,213,6724,3,6725,255,6726,192,  
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58,255,6759,195,6760,255,6761,253,6762,249,6763,245,  
6764,255,6765,255

1319 DATA 6792,3,6796,252,6819,3,6820,255,6821,255,6822,255,68  
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6829,255,6830,249,6839,15,6840,255,6841,255,6842,255

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To the... **Dr. [Name]**  
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## Printer Poser

Could you please tell me what the pins on the Dragon's printer port are, and how to address them?

*Paul Marlow  
8 Chelmsley St  
Sutton  
Birmingham  
B7 3LN*

This is another question which seems to crop up more regularly than others. The pin connections to the printer port are given in the additional information booklet or appendix. They are as follows:

Pins 1 — Status, Pins 2,3,4,5,6,7,13,15,16 — Data bit 0-7, Pins 8-12, Pins 20-24 — Data bit 8-15, other pins — GND.

Their respective I/O locations are: DPIN2 bit 0 — Data bit 0, DPIN2 — Data Output, DPIN3 bit 0 — Data bit 8, ACK is an interrupt signal, see DU March '89 for details.

## Cyclic Crash

I have two very full disks which together comprise a single adventure game. I have written for the Dragon 32 — a total programme of some 300 K. I operate on a single-disk environment, and have tried to take backup copies. Unfortunately, I get a cyclic redundancy (CRC) error on the destination disk. In copying up onto the destination disk, the destination disk does seem to have all the programme on it, and even shows the same number of bytes free.

If I then try to run a programme from the destination disk, I get a wrong file mode (F16) error.

Are you able to tell me what on earth is going on — and in particular can you explain the cyclic redundancy error to me?

*A P Johnstone  
Mild Green  
The Drive  
Salisbury  
Wiltshire*

The Dragonfile manual is a little vague in saying the level where error messages are received. A '00' error stands for 'Cyclic Redundancy error' — more commonly known as CRC. Basically, CRC's are a sophisticated way



of checksums, which can go wrong to produce a unique number which is appended to the end of each sector's data. When the data is read back from the sector, the CRC is recalculated and compared to that stored on the sector, if they are different that the data has been corrupted.

I'm afraid that this is what has happened in your case. The corrupt 4 data also causes the 'F16' error. The BIOS option will still show the disk as the directory track has not been affected and only only tracks at the end.

If you then use another disk, you may well be able to rescue most of them by using one of the Disk Doctor programs available, several of which have been reviewed in Dragon User.

## Blinking Cursor

I have a Dragon 32 and the blinking cursor is driving me nuts! How can I make it stop — and possibly even change its shape?

*J M Woodcock  
21 Tyndall Rd  
Loughall  
L13 3JN*

It is relatively simple to stop the cursor blinking, but rather more complicated to change the character used for the cursor, although it can be done.

The shift-mod-mod code reader listed below can be used to provide a steady blink cursor, once the cursor will remain steady until the machine is turned off.

10 CLEAR 290,32750  
20 IFB 1 — 32751 TO 32760  
30 READ A FROM 1 A MOD 16  
40 DATA 10,111,38,137,134  
50 IFB 167,168,136,57  
60 PRINT 380,120,PR000 290,  
127 PR000 290,230

## Video Video

I wish to connect my Dragon 32 to a 7 pin Cin 160 socket on my television via the 6 pin Cin monitor socket at the back of my Dragon. I will have to cut them myself. Could you please show me which pins to connect between these two as I have no idea.

*Colin J Bell  
404 Chazy Place  
Glenview  
Ayr  
KY7 4SA*

This is one of many letters regarding connection of RGB monitors to the Dragon. It has been answered before, but due to the number of enquiries it is worth repeating.

The Dragon's monitor socket has only three connections, pin 1 is ground, pin 2 is ground, and pin 3 is video. The video output is composite video and can only be used with colour video monitors, there is no way of connecting a Dragon to an RGB monitor other than the socket, or even direct from the video chip as this only outputs composite video.

The confusion all stems from the original Dragon manual which stated that the monitor socket was RGB, which it has never been.

## 32 plus 32 equals?

I would like to link two Dragon 32's together. I anticipate communication between the two machines and accordingly to use one as a printer buffer for the other. The obvious solution is to use an

RS232 interface but the amount I have to invest is 200 Quid!

I think the data bus of each machine can be linked directly with the other but do not know if any buffering is necessary can you suggest how I can link the two together to effect a rapid exchange of data or where I can get more information about how to do this?

*A F Welch  
44 Chesham Drive  
Chesham  
Ches CH1 5DP*

Joining two Dragon 32's is simple, via the RS232 sockets, but joining two 32's is more difficult. You cannot directly connect the data buses of the two without the use of the cartridge port — to do so would probably fry most of the end of both machines!

Your best bet is probably to purchase, or build, two I/O cards to plug into the cartridge ports and then link the Dragon via a length of ribbon cable. These cards are available from about £40 each.

## Problem String

The following line message gives me an FC ERROR message when the whole program is run:

1000 02 10000(1000) 00 11  
1000 02 00+ 00+ 1 0070 1000

I just can't seem to work out what the error is. Could you help me please?

*Steven Davies  
24 Chesham Drive  
Luton AL5  
Bedford  
LU1 7HD*

The FC command can be used to reduce any section of a string variable, over a non-existent section, it will return a null string. The only time FC will complete is if the start position — given by the variable R2 is past the end of the string. It is greater than 255 or less than 1. The error is probably caused by R2 reading 256 in which case it is too big or too small.

The Dragon manual also tends to print out that the FC command can be used on the left of an expression to change sections of a string, as in: `MODS (R2,5,3) = "123"`

This can often be very useful indeed, saving much complication at times.



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I'D LIKE to begin this month by apologizing to the people who I don't get round to mentioning in the column. Despite my having written to them promising to try to appear there more in the future, I figure. The simple reason is that there is never enough space. This month, for example, I've missed two advertisements only recently in the market. Another advertiser writes by e-mail: the latest bulletin from The Adventure Club Ltd. (the usual flow charts, brief letters and the usual dozen or so longer profiles) containing clues by the score for sharing with her members. And I've already wasted a paragraph explaining about the lack of space.

First, there's another quick reference for The Advertiser's Circle: another latest edition will be of interest as it carries a listing by industry and a complete solution to *Wages Schedules*. That's an addition for benefit of the masses. For the letters and so on that people do 24 pages. With 10 per cent of its membership being Dragon owners it's worth checking out if you monthly fix with Dragon User and I through iPhone 01 754 9201 for details.

## Beginners

David Smith of Chesney writes to agree with readers who recently asked for more tips for beginners, and I suppose it is true that I do tend to forget that there are new people reading the column each month, not familiar with other games or unable to understand how some of the solutions work. Geoff was also a little puzzled as to why the clues I give are written backwards — well it is not all that good a tip type them in backwards if they don't want to be read any more. It is just to prevent someone who is cheating playing the game backwards from inadvertently reading it in case they don't want to.

**A. Mr. Pajot:** Of course, *Microcasual* takes on "in general, is there a way through the various end-of-the-adventure games of the object just to get out of the maze again?" Let's look on that question as I'm making a advice for beginners: there's "There's no one hard and fast rule about mazes. They're just one of the frequent features of adventure games, and can be there for different reasons. The majority are probably there just to see you and test if you can find your way out again, and with most you'll find that you'll probably come out."

where you want to, but being extra careful which way you go in there. Gates will have another exit where you must decide whether to reach a new area of the game, and some real puzzles as found in *Secrets* when you have to find before you get out again. Gates will contain structures or traps that are better avoided.

## Amazing

A good stage can be enjoyable simply because you don't quite know what to expect each time, as with the adventure drama. It is one of the problems you have to reckon with with a common trope of managing a match being lit twice in the object you're carrying. You are told it is for the forest and for a typical match description. Now either what it describes you type in, you probably get the same description again. Sometimes this means you're moved to a different location which has an identical description, and sometimes you're simply been taken back to the same location. You could be going North for a lighted match, and still be in the same place, which is about as much as is trying to get anywhere on an east-west basis. But if you drop an object in a location, you can check whether you're actually standing somewhere on a stage plot. It's much like the object will not be there. Initially, maybe you find that there is, in fact, nobody return you to the same place, and the first of the following you remember the and then their standard reason and again.

A seemingly innocuous remark can be made up of just two or three apparently neutral face-acts. But you can convey much more and proceed just as carefully, at least two or three subjects, and still deliver your message as soon as you know you are in a position just to take you to just completely gone (and that happens to us all). Some group members will be the step ahead of you and move objects round if you try to drop them as they'll have it their eyes on and feel them, or perhaps cover it to floor with their foot or bump so that anything you drop immediately disappears. I must admit that I often use this kind of thing as you have to find your way out by persistence and luck. A good mind should always have a way of solving it, no matter how desolved it might be, except.

This brings me to *Castle Dragoner*, a Dragon adventure I'd never heard of till a reader wrote in to say that they had ordered it.

More any other people have experienced it all, which is a pity because it's an excellent adventure, as I can see now that the publishers have sent me a copy. This has earned me a right to the start of the game, and if you register in front of the objects, you are immediately lost. Better to get off on another direction and arm yourself with a few things first, and then if you go down to the woods that way you'll be sure of a few

[illegible]





The early locations are in and around the castle of the title. Though you should soon discover at least one way into a network of underground passages, provided you do discover the way, the labyrinth and our quest doesn't end there! In our miles lamp I wish there were more space to give you some idea of the large scale of the adventure. I do, but all I can do is recommend you buy it at £5.99 on tape or £9.99 on disk (Dragon Data drive) from SACR Adventures, 5 Churchyard Road, Sutton, Surrey KT5 8LJ.

I was slightly less impressed by Sam Buck, from Stroudport, 2 Main Street, Frodsham, Cheshire at RS 75. It might well enough with a beautifully impressive loading screen of the Statue of Liberty against a New York skyline, then being replaceable a contemporary ship-shaped cut from Sam Buck, the New York skyline eye, after a little road music and some optional instructions you're into the game itself, and both the month's title have seriously outplayed the character set for ease of reading and a better screen layout.

## Mystery

All Sam Buck you start the game at your office, find the trail of a small coffee and a murder mystery is unravelled on behalf of the type of detective who always seems to walk into the office of private eyes every where. You wander out into the streets of New York (or New York to become the game's Brooklyn woodbury). The weather is a bit inconsistent, raining in one location and too warm in the next, and the woodbury is not half as comprehensive as Clive Barker. At one point I went into the apartment of my informant, Gabe

Magpie, to see what info he could give me as the crime, and Gabe told me: "Pay out 15 bucks and stay? What would you like to stay? I bet DUCKY, YES, DUCKY, PETER DUCKS, OFFER MONEY, GIVE MONEY, GIVE TEN DUCKS, SAY YES, SAY DUCKY" mixed everything I could think of but all to no avail.

I don't care, as I never do, for the lack of a SAVE facility, or for the instructions (which include some unusual commands) not being printed on the cassette tape, or the fact that you can only make a certain number of moves before you get a time-out, I enjoyed the mystery and the pleasure to which only seems to appear once you've gone past it and returned, but it is frustrating to find that you need to wait when you're wandering off checking out new locations and so instead you have to start thinking about finding some other source of food. I will do it and you have to start the game, which is annoying, though the game

does have plenty of humorous touches (it is, and perhaps I'd like it more if there weren't so many other good adventures around at the moment).

Such as Juxtaposition of course, which John Baker of Bridgend has already completed. He offers a few clues, such as "brown before green and blue before yellow" and I think I'll be reviewing some more clues for this title next month.

Thanks to reader W. G. Jones for pointing out that you can still buy *Adventure* and the *Monitor* (which lots of people had asked me about) from Mapin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex SS9 6LH for £5.95 including p&h. Finally if anyone wants an adventure-road travel post-pal write to Stationery Supply, Halesowen, 2011, South, Coventry CV3 9JL.

All the signals and I've still left with a pile of very helpful reader's letters, all of which I'll be reviewing. May be next time — serious last word!

## Adventure Contact

To help puzzled adventurers further, we are introducing an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Help.

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Don't worry — you'll still have *Adventure* Time to write to us with!

Feb 88

## Adventure Contact

**Adventure: Fantasy Time Problems:** Don't know how to stop the water at Aqueduct after pressing button. **Name:** William Buxley. **Address:** The Cedars, Harry Lane, Merton, London SW19 8JH. **Adventure:** Sea Control and Demergence. **Problem:** Everything. **Name:** Michael Pelling. **Address:** 82 Raymond Road, Seacombe, Cheshire, B33 4DW. **Adventure:** Castle Adventure. **Problem:** How do I enter the dark forest? How do I open the small box? With what do I break the glass over the North exit? **Name:** Chris. **Address:** Basement Flat 50, Doncaster Road, Weymouth, Dorset DT14 7JY. **Adventure:** Castle Adventure. **Problem:** Cannot get out of the Wall of Gardens, also can not get response to open a chapel. **Name:** Mark Coates. **Address:** 16 Wilkes Drive, West Heath, Birmingham B12 9ST.

**513 712 Adventure:** Black Sarcophagus. **Problem:** How can I suppose to make the altar to access the end of the Abbey? **Name:** Simon Foster. **Address:** 14 Grosvenor Place, Haysdon, Essex. **Adventure:** Demergence. **Problem:** What to do at post-bombing Underground stations and how to read the sign. **Name:** Daniel Edwards. **Address:** 8, Cox, Grosvenor, Doncaster, Rugby, Warwickshire CV32 8QR. **Adventure:** Black Sarcophagus. **Problem:** I can't complete the adventure without my lantern running out. **Name:** Aron. **Address:** The Cedars, Harry Lane, Merton, London SW19 8JH. **Adventure:** Keys of the Wood. **Problem:** I can't find the sanctuary to get my treasure in. **Name:** Peter Kelle. **Address:** 7 Rochester Avenue, Feltham, Middlesex TW13 4EA.

**Adventure:** Scopy. **Problem:** What is the right macrocode co-ordinates to get to the wizard? **Name:** Laura Lamb. **Address:** Tallington, 401, 10350 Karlos, Poland. **Adventure:** 81. **Problem:** I can't open the box. **Name:** S. L. Taylor. **Address:** 14 Pembroke, Glastonbury, Wiltshire, Wiltshire. **Adventure:** Sea Control. **Problem:** I have a gold anchor and a credit card for Michael Neilson Jr — what do I do now? **Name:** C. A. Newstone. **Address:** 51 Maybush Road, Summersdale, Chichester, West Sussex PO19 4DP. **Adventure:** Kai Trilogy. **Problem:** I can't get past the giant Zorben. Can you send me the hint sheet? **Name:** Michael Bradley. **Address:** 3 Ladbroke Road, Enfield, Aberdeenshire AB9 6UR. **Adventure:** Pettigrew's Diary. **Problem:** Cannot avoid burn-

ing. No progress despite not seeing help. **Name:** G. R. Gullies. **Address:** 83 Woodbrook Road, Sidmouth, Devon EX10 8SD. **Adventure:** Contents of Doors. **Problem:** What do you do after climbing in and up in the large cavern? What do you do when both gates are? **Name:** Jeremy Smith. **Address:** 11 Silver Birch Avenue, Colchester, Essex, Colchester, Essex, CO1 3TP. **Adventure:** Return of the Ring. **Problem:** How do I get the chest open in Hain's Tree plot? Where is Moria the 8th? Can't find him. **Name:** Gordon Briggs. **Address:** 38 Dordford Place, Charnington, Northumbria, NE23 8DU. **Adventure:** Return of the Ring. **Problem:** How to get the red pass and what use is the yellow pass? **Name:** Darren Briggs. **Address:** 38 Dordford Place, Charnington, Northumbria, NE23 8DU.



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### Technical Core

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# Firmware

Brian Cudge explores the Dragon's ROM in a special series which builds up month by month into a firmware manual

This month we look at the various **firmware vectors** used for **Reset**, **Interrupts** and **Expansion**

## Reset Vector

The hardware is configured so that a reset always jumps to the ROM. The ROM routine first of all checks location 110; if this is not set to 00-decimal then a full Cold Start is performed. Next the address of the reset source is latched from location 114-115, and as a double check for power up, the reset routine checks that the first instruction of the reset routine is a NOP. If it is not then a Cold Start is performed. The standard reset routine reads the text screen and clears it, stops the cassette and disk, resets the stack and enters the Command mode.

## Interrupt Vectors

The external IRQ interrupt is created by the Field Sync of the TV, and occurs 60 times a second. This is used to update the frame location (014/015) and to decrement the generated purpose count down facility (141/142). With Dragonos attached, the IRQ is also used to control the disk motor on delay.

The IRQ interrupt is caused by one of the two inputs — either a cartridge is present, or an ACK signal has been received from the Printer. The Standard IRQ ROM routine checks for the interrupt via caused by a cartridge by looking at the cartridge flag (bit 7 of 01F03) and returns a response. If a cartridge is present then after a delay a cold start is performed to the cartridge. With Dragonos attached the ROM routine simply clears the interrupt by clearing locations 04F01 and 04F02 and then returns.

The IRQ is not normally used, and does not have a ROM routine. It is used by the Dragonos cartridge and a ROM routine is set up to deal with it — the IRQ vector should not be changed with Dragonos as it will then be impossible to access the disk correctly.

The 6809 CPU allows for three software interrupt controls: the Basic ROM does not use any of these and does not have any routines to deal with them — they are available to the user. The CPU vectors are mapped from the ROM into locations 04F02 to 04F0F and are not alterable. These point to Extended page RAM locations which can be patched by users. The first byte should always be a JMP instruction, followed by the address of the routine.

The RAM vectors for interrupts are as follows:

050-058	SWT-Jump Vector
059-061	SWT-Jump Vector
062-064	SWT-Jump Vector
065-067	RAM-Jump Vector
068-070	IRQ-Jump Vector
071-073	IRQ-Jump Vector

## Expansion Vectors

There are 35 expansion vectors. These are one byte each and normally contain RTS instructions. They can be patched with a JMP instruction to expand the system —

they are used by Dragonos for example just before a character is output — this could be patched to provide a customized screen driver.

Note that Device numbers are allocated as follows, and that the current device is stored in DEVN — location 111:

0 = VDU,
1 = CASSETTE,
2 = PRINTER

## 000 Device Open

Called immediately before an OPEN command is executed

## 001 Device Number

Called whenever a Device Number is verified. It can be patched so that normally out of range numbers can be used — eg for disk files.

## 004 Device Initialization

Called immediately before setting up the current device parameters in locations 100 to 109.

## 008 Output Character to DEVN

Called immediately before outputting the character in the A register to DEVN.

## 002 Input Character from DEVN

Called immediately before inputting a character from device DEVN into the A register.

## 005 Input File

Called before inputting from a file using INPUT.

## 006 Output File

Called before outputting to a file using PRINT.

## 071 Close All Files

Called before all files are closed — actually action is only taken if the cassette is open.

## 074 Close File

Called before a device is closed by the CLOSE command — action is only taken if the device number in DEVN is -1.

## 077 Command Interpreter

Called before interpreting the taken in the A register as a command. This is used by Delta Doc for adding new commands to Basic.

## 088 Re-Request Input

Called before re-requesting more data from the keyboard is not before the ? prompt.

## 090 Check Keys

Called before the keyboard is scanned for Shift and Shift in. The keyboard is not scanned if the DEVN is -1. This vector can be patched to disable BREAK.

## 096 Line Input File

Called before a LINE INPUT command is executed on the current DEVN.

## 089 Close File and Command

Called before closing an ASCII file system in a Basic program by CLOSE and returning to Command Mode.

## 092 Check EOF

Called before checking for EOF for the current DEVN.

## 095 Evaluate Expression

Called before evaluating an expression.

## 096 User Error Trap

Can be patched by the user (in a Basic Program) to trap error messages.

## 401 System Error Trap

Can be patched by the system (in Basic extension ROMs) to trap or extend error handling. This is used by Dragonos.

## 404 ROM Link

Called when a ROM command is about to be executed. Patched by Dragonos to allow a disk filename to be specified after the ROM command.

## 407 Reset Basic Memory

Called from two routines in the ROM — before the Basic Memory Vectors are changed by entering or exiting Basic, or loading programs etc.

## 410 Get Next Command

Called before reading in the next Basic command to be executed during runtime.

## 412 Assign String Var

Called before assigning a string to a string variable.

## 416 Screen Access

Called before the CLS, GET and PUT commands are executed.

## 418 Tape-to-Line

Called before an ASCII line is converted to internal Basic format.

## 423 Tape-to-Line

Called before a tape-to-line is converted to ASCII characters.

## Next Month: Miscellaneous Firmware Functions & Routines

This is the path in Brian's notes on the Dragon's ROM routines. Next month he will be covering Firmware Vectors. If you have missed any of the previous issues, they can be obtained from Dragon User Back Issues, 12-13 Little Newport Street, London WC2N 7PP, at £1.25 each, inclusive of postage packing and administration charges.

Just to remind you of previous months:  
Sept 85 — Cassette Operating Systems  
Oct 85 — COS Firmware Routines  
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# Competition Corner

Answers to Competition Corner  
Dragon User, 15-16 Little Newport  
Street, London WC1N 7TP

## Seeing stars

The historical potency of Haring's comet has led to a greater than usual interest in matters astronomical, although now that it is heading back into the depths of space, comet watchers will have to wait until the year 3062 AD — the date of its next predicted return.

Professional astronomy is a field of study which is now heavily dependent on computers, and there is little reason why any amateur astronomers, who are also adept at programming, should not use their computers as a valuable aid. A quick glance through the pages of any astronomical almanac will reveal columns of figures detailing the R.A. (right ascension) and declination used for locating the various stars and planets on given dates, and anyone with understanding of celestial mechanics could, no doubt, produce a program to display a star map for any date, time, and location. This would be a keen twentieth century version of the ephemeris — those mechanical models used by early astronomers to show the movement of certain planets round the sun.

On a less complex level, readers might be interested in writing their own program based on the following calculations which determine the moon's age (phase) on any given date. The moon has a diameter of 2160 miles and orbits the earth at a mean distance of 238,857 miles. It rotates on its own axis every 27.32 days, which is also the time it takes to orbit the earth. It is

for this reason that we can only see one side of the moon, and the period 27.32 days is known as a sidereal month. However, the phases of the moon are related to its synodic month, that is the period between one new moon and the next. This is a period slightly in excess of 29½ days.

The calculation which follows is taken from a very old book on astrology, and although the theory behind it is rather obscure, it does give surprisingly accurate results. In order to demonstrate its use, the calculation for finding the phase of the moon on St Valentine's day (14th February 1985) is given in Table One.

The final remainder tells us that on the given date the moon will be just three days after new moon. Note that a full moon will be 16 days 14/15 days, and a new moon at 0:00 days.

Adapting the above method into a computer program should not be too difficult, and as a check for accuracy in the programming try the following dates.

Group A — April 9th 1955, October 3rd 1955, March 26th 1957, September 23rd 1957, and March 16th 1955

Group B — April 24th 1955, October 17th 1955, October 7th 1957, August 27th 1955, and February 25th 1955

All these dates in group A are days on which there will be an eclipse of the sun, and those in group B, an eclipse of the



moon. As an eclipse of the sun can only occur when the moon is new, and an eclipse of the moon can only occur when it is full, these dates can be used as a useful check of the program.

### Competition

As it is almost St. Valentine's Day, perhaps I might be allowed the following message to my wife:

GORDON  
LOVES  
DENISE

It seems a pity to spoil the romance of the moment, but the message so shown forms an algebraic sum. The sum is a simple addition, not quite so simple however, as substituting digits for letters — a different letter denoting a different digit, the same letter denoting the same digit whenever it occurs. If this is done correctly it will work out exactly.

Can you find the solution? (Note that in puzzles of this type you are not allowed to put a period in leading digits, e.g. in the case of 10, 1, or 0.)

Table One

Double the year by 16 and note the remainder	1985x16 = 31760
Multiply this remainder by 11	31760x11 = 349360
Double by 30, and again take the remainder	349360x30 = 10480800
Add the number of centuries (the year divided by 100 ignoring remainder)	20x8 = 160
Add the number of centuries (the year divided by 100 ignoring remainder)	20x4 = 80
Add	30x8 = 240
Subtract number of centuries in year	30x18 = 540
Add months (Jan = 1 Dec = 12)	17x2 = 34
Add day	19+14 = 33
Finally divide by 30 and take remainder	33-30 = 3

### Prize

This month, we are offering 25 prize certificates of Incentive Software — indeed they are offering you the choice of any one of their pre-moon Cresta Dragon releases.

### Rules

To win an incentive game, you must first show the answer to the above competition, and demonstrate how you solved it with the use of a BASIC program written on your Dragon. Please do not send in a cassette containing your program. Make sure your name and address are clearly printed on your entry and mark

the envelope "February Competition". Envelopes which do not state which month you are entering for will be disqualified.

As a tie breaker for this month, how many of Incentive has set you a further task. How many dedicated space arcade game machines can you name? The 25 correct answers that can name the most will win a prize, and can I target to nominate which game you would like to have.

### November Winners

The lucky winners of the November competition have won themselves

copies of Best Star by Design Design. Congratulations go to the following:

At present at 25 Westcott Drive, Westcott, Cheshire, C. M. Royall of Carlisle, Steven Aubrey of Swindon, Terry Potter of Cheshire, M. Gwynne of Tonbridge, M. Ingham of Leeds, Cayuela S. S. S. of Stoke, France, M. M. S. S. of Tinsworth, R. F. Wilson of Swindon, P. L. Bates of St. Albans, R. H. E. S. S. of Oakley, Andy Grubb of Royston, Cheshire, A. J. Parsons of Winton, Paul P. P. P. of Lechlade, R. C. S. S. of Northampton, R. J. S. S. of Salford, P. P. P. of Salford, Charles G. G. of Windsor Hill, Co. Cork, M. H. H. of Warrington, C. H. H. of Warrington.

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